of a double inclined plane, has been mentioned as favoring thrombosis.

Estimation of the risk of operation because of a cardiovascular condition resolves itself into a question of the efficiency of the heart muscle. Determinations of cardiac efficiency and muscle damage are arrived at by a careful correlation of physical findings and symptoms and, to some extent, by instruments of precision. History, objective and subjective signs and symptoms of impaired function are still of more importance than the detection of changes in the heart itself by stethoscope, x-ray, or electrocardiograph. These latter indicate a change has taken place in the heart, but tell us little of its reserve power and function that cannot as well be determined by physical examination. However, coronary disease and excessive enlargement of the heart both indicate a bad prognosis, and their presence is often only definitely determined by the electrocardiograph and x-ray, and these aids are of real value in prognosis in many cases.

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Francis M. Smith, M. D. (Scripps Metabolic Clinic, La Jolla).—Any discussion of the considerations to be given the circulatory system in coping with pre- and postoperative cardiovascular complications must concern itself with a many-sided problem. Doctor Holder has made an exemplary study of the problem and little can be added to his presentation. A few points only will be emphasized.

Since as surgeon, anesthetist, and consultant we are concerned in bringing the patient through the indicated surgery and required anesthesia, we must first give careful consideration to the general condition of the patient in its bearing on the adequacy of the myocardium in sustaining a load, especially any extra load.

There seems to exist in the minds of the internist and surgeon alike a confusion between heart disease and heart failure; in reality a very sharp distinction does exist, the importance of which increases as the necessity for surgical intervention arises. One need only recall the large number of persons with definite cardiac disease leading essentially normal lives for every one person incapacitated by heart failure. And the problem then is to make this differentiation.

Adequate history of the patient's response to effort as tested by his or her daily life in its many-sided activities, both physical and mental, is beyond doubt the most essential source of information regarding the functional condition and reserve capacity of the heart muscle. Thus it becomes a most important avenue for determination of the degree of surgical risk as regards the cardiovascular system. Augmenting the history by correctly evaluated physical findings, especially evidence of visceral congestion and the less important, though occasionally clinching instrumental data, we arrive at an exact and therefore comforting knowledge of the nature and degree of pathologic physiology encountered, and treatment can then follow well-established and rational lines. In general, then, it may be said that a diseased heart, regardless of its physical signs, as murmurs, thrills, etc., or its size, can be considered a normal one for the purposes of operation and anesthesia, if it is able to carry on an adequate circulation under normal conditions of life, with the possible exception of the luetic heart.

The facts concerning the use, and somewhat of the abuse, of digitalis as a cardiac medication has been covered by the author and the other discussers. Little need be added. The requirements of surgery in no way alter the indications for digitalis from those experienced in medical practice, which, in brief, are:

1. The presence of congestive heart failure regardless of type of mechanism or nature of cardiac disease found.

2. Presence of auricular fibrillation or flutter with ventricular rate above normal even in the absence of heart failure.

Given these indications digitalis should be administered in full therapeutic amounts or not at all. The dosage, preparations used, method and interval of administration must be carefully individualized.

A final word as to the accessory methods of treating heart failure. The value of certain diuretics should be emphasized. Doctor Keeney has mentioned these which include ammonium chlorid, ammonium nitrate, and salyrgan. There is an important and large group of patients, usually elderly persons having arteriosclerotic or hypertensive heart disease, who ultimately reach a state of chronic congestive heart failure in whom rest, sedatives, cardiac diet, restriction of sodium chlorid in fluids fails of relieving the water-logged condition. Even digitalis is without beneficial effects and not infrequently small doses provoke toxic rhythms, including ectopic beats, runs of fibrillation, coupling and tachycardia. In these patients the ammonium salts and salyrgan, alone or in combination, as indicated, may in a few days work wonders when every method of therapy tried over long periods has utterly failed. These drugs have been repeatedly observed to literally wring a chronically water-logged patient dry with subsequent marked improvement in cardiac reserve as the visceral congestion was removed.

PSYCHOLOGY IN THE PRACTICE OF MEDICINE*

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"HOME-MADE" psychology is as old as medical practice. The mass of modern physicians still employ the home-made brand of psychology more or less intuitively and more or less successfully, but without any special training or study, or even any definite idea of how they apply it.

In modern times, in line with the general scientific trend, more attention has been directed to research in psychology. From the older school of philosophy have developed philosophic psychology, analytic psychology, experimental, comparative and genetic psychology, psychology of childhood and of insanity, pathologic and behavioristic psychology, psychology of salesmanship, of business and of love. The elaborate intelligence tests must be included and, last but not least, the Freudian movement, which has largely divided the psychologic world into loyalists and dissenters. It is worthy of special comment that everyone who devotes some attention to psychology soon becomes a psychologic bigot in that he believes aggressively in his own theories and is intolerant of others.

During the past twenty years the world has been inundated by the flood of psychologic literature. Neurologists and psychiatrists have made more or less serious efforts to cull something of practical value from the mass, while the rank and file of medical men have paid it only casual attention and have continued with their more or less efficient "home-brew" methods.

This contribution is a personal confession of faith. In an effort to evolve something of practical value which could be applied to the practice of medicine, and particularly to neuropsychiatry, I have gained certain conceptions and arrived at certain conclusions which will be sketched as well as possible in the brief time available, without going into a detailed criticism of any school,

* Chairman's address, Neuropsychiatry Section, California Medical Association, at the Fifty-Eighth Annual Session, May 6-9, 1929.

method or psychologic sect. To me the matter has appeared as a practical problem. How far can I analyze and explain the mental reactions of my patients? How practical can I make this knowledge in their service? The best way I can present the subject is to sketch my conception of some basic principles of psychologic processes in general.

I confess to being a materialist, and, reduced to its last analysis, my conception is entirely a mechanistic one. Every sensation, every reflex, every emotion, every thought takes place on the basis of physiochemical reactions in nerve structures. As the neuron theory is fundamental in anatomy of the nervous system, so nerve energy, liberated by neurons and transmitted over the axons, is fundamental in physiology of the central nervous system, not only as manifested by physical activities but as including all mental processes. Highly specialized appropriate structural arrangements in a condition of health and vitality are indispensable for all normal activities of the nervous system. These highly specialized structural arrangements exist not only in every human being, but in every animal possessing a nervous system, also in a less complex arrangement in many of the plants, as for example, in the Venus's fly-trap. The inconceivably complex arrangements of these highly specialized nervous mechanisms preclude the possibility of dissecting or even identifying the nerve centers or tracing the nerve pathways concerned with mental functions. The morphologic conception which would explain cerebration on a mechanistic basis leads certain metaphysically inclined psychologists to look disdainfully upon the "morphologically minded neurologists." Frankly admitting the allegation, I will proceed to outline a neurologist's point of view.

According to the theory of evolution, structural development has proceeded from the simplest to the most complex organic forms by infinite series of gradations. By the processes of natural selection and the survival of the fittest, nature has adopted and retained innumerable variations in structure which have been useful to all forms of organic life in meeting their environmental problems throughout the ages.

Successful variations and new capacities always depend upon improvements in structure. Each living thing has developed its equipment to meet certain conditions of its environment. As environments differ, so do the forms, functions, capacities and limitations of living things. The development of connecting and controlling nerve structures has been an essential part in the evolution of specialized organs, as those of sensation and locomotion. Organs of special senses required not only nerves to carry their messages to the brain, but structures there to interpret the messages and memorize them. For each manifestation of nervous energy, including all psychologic processes, appropriately arranged nerve structures must be postulated. The development of the nervous system of animals has proceeded in this manner, and the brain of man is the crowning achievement of evolution in structural perfection and functional capacity.

A WORKING CONCEPTION OF PSYCHOLOGY

For a working conception of psychology it may be useful to speculate as to how certain important neurologic and psychologic activities have evolved, always bearing in mind the anatomic structures concerned as well as the mental manifestations. Thus we might consider, briefly, reflexes, habits (pattern reactions), instincts, emotions and intelligence, and meditate regarding the significance of attention, choice, consciousness and the subconscious, memory, association, reason and judgment, still remembering the appropriately arranged nerve structures upon which these activities depend, without attempting to localize them. If we were not already treading on dangerous ground we might venture further into the field of speculation, in various directions.

Habits.—By some biologic law it appears that successful adaptations tend to be repeated, and frequent repetition leads to better performance. Highly developed adaptive reactions have been called pattern reactions, and habits, acquired pattern reactions.

Instincts, sometimes called inherited habits, might with more conservatism be considered inherited pattern reactions. They have been described as the capacities of animals to perform acts more complicated than simple reflexes in a perfect manner without learning or practice. According to this definition, the instincts are manifested in pure form most frequently in the lower animals because in the higher animals intelligence, learning and practice appear to be necessary for the perfection of many specialized activities. As the animal scale is ascended it is evident that behavior is more and more modified by the influence of intelligence, choice, and practice.

Reflexes.—By the same process by which habits appear, viz., repetition of successful adaptations, certain reactions become automatic or reflex, their activities being called forth by specific appropriate stimuli, and their operation depending upon the so-called "lower" nerve centers. Such reactions, each liberated by an appropriate stimulus, are called reflexes and are, at least for the most part, inherited. Habits and instincts are also called into activity by special appropriate stimuli, and so resemble reflexes, but habits and instincts are more complex and include a participation of the "higher centers." *Conditioned reflexes* occupy a position between the inherited reflexes and instincts on the one hand, and acquired habits on the other. Pavlov, through many years of experimentation, has demonstrated the prominent rôle that conditioned reflexes play as adaptations to environment and, as sensitized emotions are really conditioned reflexes, it is difficult to overestimate their importance.

Intelligence, of course, defies description. For this discussion intelligence is conceived as the information bureau, the newspaper "morgue" as well as the reporter on the street; this department of the mind is concerned with the organs of the

special senses, instruments of precision for detecting sound and light waves, the chemical analysis of gases, liquids and solids, and the physical properties of things contacted. Sensations and experiences are analyzed and recorded. This material is classified and digested by thought processes and filed away for future use. Of much importance in this connection are the decisions and judgments which have the force of precedence and economize time and effort in later adaptations. When sound they promote success, but when they are fallacious or prejudiced they lead to error, failure, or disaster. Intelligence, as here conceived, deals with facts, figures and records as such, in contrast to the emotions which are concerned with their importance.

Attention might be called the focus of intelligence, or perhaps better, its spotlight, illuminating either the untraveled path through the forest, the familiar road to the office or the dusty recesses of memory. But as a spotlight illumines only a limited area of the landscape, so attention reveals to consciousness only a spot in the field of intelligence.

If we pursue our simile in regarding intelligence as the bureau of information, and attention as the spotlight, we might conceive that *consciousness* is the illumined area of intelligence. Consciousness has been described as the state of awareness and, returning to our simile, we are aware only of the things that are in focus and illumined. In general it might be said to deal with the awareness of the relation of things to each other in our environment, and with ourselves in relation to the environment in general. Since it depends upon the normal activity of the sense organs, memory, thought associations and other processes of the intelligence, it would seem that whatever else it may be consciousness might be considered as one manifestation of intelligence. Emotions, on the other hand, do not appear to be factors of consciousness, and active emotions even tend to inhibit it by limiting its field as they do the field of intelligence.

The Subconscious.—If consciousness be conceived as the area in the field of intelligence illumined by the spotlight of attention, the subconscious may then be considered as the vast unillumined areas of the same field which lack the light of attention. That activities take place in these dark areas there can be no doubt, as attested by modern literature and common experience. Exploration beyond the frontiers of consciousness has become a popular indoor sport.

Emotion.—For purposes of this discussion the term "emotion" is used broadly and signifies any nervous reaction which depends upon a feeling tone related to any success or failure, and not only as regards the immediate present, but also in anticipation or in retrospect. From the beginning of organic evolution the question of success or failure has been vitally important to all living things. Success tends to preservation of the individual and perpetuation of the species, while failure tends toward death and extinction. The survival of the fittest is based upon this principle. As the scale of life is ascended anticipation, realization and memory of successes and failures can be recognized in animal behavior. Anticipation is signalized by desires or fears, realization by pleasure or grief, and memory by satisfaction or disappointment. In this manner it may be conceived that the emotions have evolved, each having developed as a pattern reaction which has proved useful to the species as an adaptation to a special situation. Since it is evident that emotions are spontaneous in their manifestation, or rather that they are manifested as reactions initiated each by its specific stimulus, and that the capacity to react and the manner of reacting is inherited, it seems reasonable to class the emotions with the instincts. They obviously have little in common with intelligence. Emotions may be divided, according to the above conception, into two groups separated by the line of indifference; on the one side those related to success, and on the other those related to failure. Desire, hope, pleasure, and satisfaction are on the positive side of indifference, and apprehension, fear, anger, grief and despair are on the negative.

No attempt will be made here to list or describe all the feelings or emotions, but a word might be said in emphasis of their importance. Speaking broadly, it may be said that all motives take their origin in the emotional field, and, if we can assume that human behavior is always based upon motives and impulses, then, speaking more broadly, it might be said that all human behavior is primarily activated by emotions. Furthermore, if emotions can be classed with the instincts, human behavior is determined largely by instinctive forces.

Choice.—In situations where two or more possible courses of action are open, only one of which can be followed, a choice becomes necessary and that course is chosen which offers the most to the chooser, either by gratifying an immediate desire, or by promoting future success. Choice is, therefore, the process of selecting the most desirable thing in sight, with or without due consideration of the chances of obtaining it and the difficulties or dangers incident to the effort. It is a decision in favor of one of two or more claimants. It is a play of the emotions and at times a serious conflict. Each of two incompatible desires presents its heated argument, emphasizing facts furnished by intelligence which seem favorable to its course and belittling those intelligent truths which seem unfavorable. The desire that wins the decision is either the one that has the best array of facts, or the one that is the most emphatic. Many a choice is made against the preponderating weight of intelligence because of the force of emotions. Man in his position on the heights of intelligence not only *enjoys* a wide range of choice, but often *suffers* from it. To be effective the exercise of choice must be followed by adequate inhibition of the denied desire.

Will.—Controversies over the definition and significance of will have always been puzzling. It would seem that the exercise of will is the process of putting into execution a choice that has been decided upon, and inhibiting impulses that

tend to interfere. When emotions, utilizing more or less intelligence, have exercised choice to form a decision favoring a certain plan of action, will proceeds to put that plan into operation. It is strong when choice is positive and contrary impulses are successfully inhibited, and weak when decision vacillates and interruptions of the plan of action are permitted. Decision of character signifies strength of will, and indecision, weakness.

ELEMENTS IN AN ANALYSIS OF BEHAVIOR

With a general conception of the elemental processes of psychology as outlined above, we may attempt to summarize and apply them in the analysis of behavior. According to this conception:

Habits are acquired pattern reactions.

Instincts are inherited pattern reactions.

Habits and *instincts* are complex reflexes or pattern reactions which normally facilitate adaptation.

Emotions are instinctive (possibly also to some extent acquired) pattern reactions related to feelings of success or failure.

Intelligence is the bureau of information where facts are collected through the senses, digested by thought and recorded in memory.

Attention is the spotlight of intelligence.

Consciousness is the spot in the intellectual field illumined by attention.

The *subconscious* is the unillumined part of the same field, where vague activities occur but which are not illumined by attention.

Will is the process of enforcing choice and inhibiting unfavorable tendencies.

An important part of this conception is the mechanistic view that each individual is equipped by inheritance with adequate nerve cells and fibers appropriately arranged and connected, and capable of acting and reacting by physiochemistry in a manner to explain all neuropsychiatric activities.

AN EXAMPLE

If we attempt to explain the sequence of events in the performance of a simple act, it may be conceived as follows: A boy sees an apple on the ground which he picks up and eats. What happens? Visual sensations carry the image of an apple to the cerebral centers, where it enters the spotlight of attention and intelligence compares it with the memory of other apples. This information being available to the emotions, desire, prompted by hunger, makes a bid for it (the apple). Caution suggests that the farmer might be looking, but is quieted by a report from the information bureau that no farmer is in sight, based upon a survey of the landscape. Choice decides that the opportunity is favorable, and will takes charge of the situation to enforce possession of the apple, utilizing the habit reactions of walking, balancing, focusing the eyes, and other pattern reactions guided by intelligence. The apple having been obtained, it is then eaten with pleasure and the boy goes on his way with satisfaction. Of course, what happened was not so simple as this explanation would indicate. There were innumerable details, not to mention the possibility of some obscure sexual meaning back of it all.

In this illustration we can ascribe various of the elemental psychologic processes, such as attention, memory, consciousness, emotions, instincts, intelligence, habit reactions, and will. Each plays its part to the ultimate result of a successful adaptation. Emotions play a predominating part in that they furnish the motives. Intelligence also plays an important part, but is secondary to the emotions since the force of intelligence is always used in the service of some emotion, for the attainment of some desire.

APPLICATION TO MEDICAL PRACTICE

Ill health may be caused not only by primarily mechanical derangements, but also by various emotional reactions which not only interrupt useful physiologic activities but often lead to mechanical derangements as a secondary result, as for example, states of malnutrition, exhaustion and toxicoses, due to faulty elimination, disorders of metabolism, and endocrine dysfunction.

Each patient treated by the physician requires a personality study in addition to a purely physical diagnosis. This is particularly true as regards the neuroses and psychoses, where maladaptations and disturbed emotions are most prominent. The physician must analyze the varying psychologic factors and understand the patient's temperament and mental habits, and be able to predict his reactions under given circumstances. From such a personality study it is usually possible to recognize ignorance and misconceptions, bad habits and impractical selfishness or generosity, pernicious conditioned reflexes which have led to serious maladjustments, which in turn have resulted in failures and corresponding depressing emotional reactions, and often ultimately in a neurosis. To read the sequence backward it might go thus: neurosis, depressing emotions, failures, maladjustments, misconceptions and ignorance, impractical selfishness.

The law of cause and effect holds good in psychology as in physics, and the best way to modify effects is to get at the cause of things, whether it be a diseased appendix or a neurosis. Since neurosis so often takes its origin in ignorance, inadequacy, misconceptions and bad mental habits, the correction of these is of vast importance.

SUMMARY

To return to the question, how can I best serve the needs of my patients, I might summarize as follows:

1. Comprehensive psychologic diagnosis.
2. Reëducation of patient by: (*a*) Proving to him his errors and their importance. (*b*) Training him in good habits.
3. Maintaining a truly friendly as well as a constructively critical attitude.
4. Careful avoidance of unfounded statements.
5. Stimulating courage by holding constantly before the patient his most hopeful prospects.
6. Constant attention to the physical health as well as the psychiatric needs of the patient.

As stated in the beginning, this contribution is a personal confession of faith. I might conclude

by saying that I preach and try to practice the creed of cheerfulness, hopefulness, friendliness, truthfulness, frankness in facing facts, courage in meeting issues, persistence in efforts to solve problems and intelligence in effecting better methods of adaptation.

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MOUTH INFECTIONS IN RELATION TO SYSTEMIC DISEASE*

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IN discussing mouth infections in relation to systemic disease, I do not intend even to attempt to cover the whole subject from all angles. It would be beyond the scope of my thesis. Rather I would confine myself to presenting to you the diagnostic importance and the peculiar, possibly pathogenic, relationship of certain types of stomatitis to systemic disease, stressing somewhat the rather remarkable blood pictures that are in some way linked up with mouth infections. From this brief introductory passage it may be seen that I will omit specific infections of the tongue and mouth, such as syphilis and tuberculosis; I will refrain from mentioning the various fungous infections of the tongue which are relatively common in the southern part of the United States; I will pass over local infective processes of the mouth, the stomatitis and gingivitis secondary to poisoning by the heavy metals, the dermatoses of the mouth, the mouth infections that occur in the course of the typhoid state, in uremia, diabetes, pregnancy, and so on. Nor do I propose even to mention the bearing that focal mouth infections have on the production of apparently nonrelated somatic disturbances. I will deal only with the following types of stomatitis:

I. Stomatitis in the Acute Contagious Diseases.
   1. Measles.
   2. Scarlet fever.
   3. Diphtheria.
   4. Varicella.
   5. Variola.
   6. Vincent's angina.

II. Stomatitis in the Deficiency Diseases.
   1. Beriberi.
   2. Scurvy.
   3. Pellagra.
   4. Pernicious anemia.
   5. Sprue.

III. Stomatitis in Diseases with Peculiar Blood Reactions.
   1. Anemia.
   2. Hemophilia.
   3. Chlorosis.
   4. Infectious mononucleosis.
   5. Leukemia (acute).
   6. Agranulocytic angina.
   7. Aplastic anemia.
   8. Purpura hemorrhagica.

* From the Department of Medicine, Tulane University School of Medicine.

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I. STOMATITIS IN THE ACUTE CONTAGIOUS DISEASES

In some of the acute contagious diseases stomatitis is part and parcel of the general clinical picture and is of considerable diagnostic importance. After all, in the acute contagions, diagnosis is of primary importance because the earlier the disease is recognized and appreciated the more efficacious will be the specific treatment available for the handling of several of these disorders.

Measles.—In measles there are found the small bluish-white spots surrounded by a red areola known as Koplik's spots. This peculiar enanthema is familiar to all. The fact that Koplik's spots can be observed satisfactorily practically only in bright daylight is not generally appreciated, and explains why frequently they are not seen because the small hand light, very generally used to examine the mouth, does not give proper illumination.

Scarlet Fever.—The angina of scarlet fever is one of the important diagnostic criteria of the disease, but equally important, I believe, is the examination of the tongue. The bright red tip and edges with a whitish coat on the dorsum presents a characteristic picture, and the disappearance of the white fur twenty-four to forty-eight hours afterward clinches the diagnosis, but it is unwise to wait until the diagnosis is clinched because the prompt administration of scarlet fever serum produces a rapid amelioration of symptoms and rash. Therefore, of particular moment is the appearance of the papillae of the tongue, which are very distinctly enlarged, protruding very pronouncedly from the surface of the mucous membrane. These may best be appreciated also with proper lighting. The tongue should be held slightly at an angle to the light so that a shadow is cast by these protruding papillae which intensifies and brings them out more markedly than when looked at with the light shining on them directly. The buccal mucous membrane also shows evidence of the angina. Sometimes when the throat can be poorly seen, as with a struggling child, the appearance of the rather red, glistening, almost edematous-appearing mucous membrane is a distinct diagnostic aid.

Diphtheria.—Diphtheria of the mouth is rare. In a very large series of patients that I have had the opportunity of observing in the past few years only two cases have occurred, and in both of these, needless to state, the disease was far advanced when admitted to the ward, and extensive diphtheria involvement of the mouth and throat existed. Incidentally, the only patient who has died from nasopharyngeal diphtheria was one in whom the mouth was likewise involved.

Varicella and Variola.—In varicella, ulcers occasionally appear in the buccal mucous membranes, but aside from their annoyance, being painful like all ulcers of the mouth, they are of no moment. In variola pustules may form in the